

CORRESPONDENCE

Health-related quality of life does not mediate the protective effect of farming on asthma and allergic disease

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To the Editor,

Recently, children living on a farm were shown to have higher health-related quality of life (HRQOL) than their rural peers (1). Data from the same cross-sectional GABRIEL Advanced Surveys indicate that HRQOL does not explain the protective effect of exposure to farming environments on asthma and allergic disease (2). However, the authors suggested that the relationship between allergic diseases and HRQOL is likely to be bidirectional and needs to be assessed prospectively.

We have conducted yearly follow-ups in one study centre (Ulm, Baden-Württemberg, southern Germany) of the GABRIEL Advanced Surveys from 2010 to 2012. Of the 2,248 children aged 6–10 yr assessed at baseline in 2006/2007, 2,035 (90.5%) provided data on HRQOL at baseline and the incidence of asthma or allergic disease in at least one of the follow-ups. Ulm University's Ethics Committee approved the study.

To ease comparison, we chose definitions identical to those reported by Stöcklin et al.(2). Children living on a farm currently run by their parents or other relatives were classified as farm children; all others were non-farm children. Asthma was defined as reports of wheeze, the use of an asthma inhaler, or a doctor's diagnosis of asthma at least once or wheezy bronchitis more than once. Hay fever was defined as reports of a runny nose accompanied by itchy or watery eyes or a doctor's diagnosis of hay fever. Atopic dermatitis was assessed by reports of a doctor's diagnosis only. We excluded children with reports of asthma ($n = 373$), hay fever ($n = 236$), and atopic dermatitis ($n = 309$) at baseline. The cumulative incidence (reports of the respective disease in at least one follow-up) over the 5-yr follow-up period was computed. Children's HRQOL

at baseline was reported by parents and measured by the KINDL-R(3).

Due to the complex survey design(4), we modeled stratified weighted logistic regressions. All statistical analyses were performed using SAS® 9.2 (The SAS Institute, Cary, NC, USA).

Table 1 shows the protective 'farm effect' on the cumulative incidence of asthma, hay fever, and atopic dermatitis, the latter not being statistically significant. Adjustment for the set of confounders predefined by Stöcklin et al.(2) had no substantial effect. Additional adjustment for HRQOL did not alter the point estimates for the protective 'farm effect' on the incidence of asthma, hay fever, and atopic dermatitis. This indicates that HRQOL does not mediate the protective 'farm effect' (Table 1).

Furthermore, the incidence of hay fever and atopic dermatitis was higher in subjects with low compared with high HRQOL. However, this difference did not reach statistical significance for any of the disease outcomes. Besides, the effect size of this association was rather small, making a relevant mediation of the much larger 'farm effect' on allergic disease incidence by HRQOL unlikely. For completeness, the addition of farming status to the adjusted model left the association between HRQOL and asthma or allergic disease unchanged excluding mediation by exposure to farming environments.

Our prospective study design allowed us to eliminate the effect of prevailing asthma or allergic disease on reported HRQOL. We were thus able to investigate the other suggested direction of effect, that is, the effect of psychosocial factors on allergic disease development(5). We have only assessed HRQOL and lack more comprehensive data on psychosocial

Table 1 Association (OR (95% CI)) between farming status as well as health-related quality of life with cumulative incidence of asthma, hay fever, and atopic dermatitis

	Asthma $n = 42$ (3.75%) [†]	Hay fever $n = 90$ (9.16%) [†]	Atopic dermatitis $n = 42$ (3.60%) [†]
Farm vs. Non-farm			
Crude	0.51 (0.25; 1.02)	0.31 (0.18; 0.53)	0.58 (0.29; 1.15)
Adjusted [‡]	0.55 (0.26; 1.16)	0.38 (0.22; 0.66)	0.59 (0.28; 1.24)
Adjusted + HRQOL	0.55 (0.26; 1.16)	0.38 (0.22; 0.66)	0.59 (0.28; 1.24)
HRQOL (low vs. high) [§]			
Crude	0.97 (0.66; 1.42)	1.17 (0.86; 1.58)	1.29 (0.78; 2.13)
Adjusted [‡]	1.01 (0.69; 1.49)	1.22 (0.89; 1.67)	1.36 (0.82; 2.26)
Adjusted + Farm	1.02 (0.69; 1.50)	1.28 (0.93; 1.77)	1.39 (0.84; 2.30)

[†]Incidence in unweighted n (weighted%).

[‡]Adjusted for family history of allergic diseases, number of siblings, sex, and smoking during pregnancy. Further adjustment for parental educational level as in the study by Stöcklin et al.(2) had no effect on the point estimates and was omitted.

[§]Effect of low vs. high HRQOL comparing the 1st to the 3rd quartile of the whole population, that is, for a difference of the interquartile range.

distress or poor social support in our study population. This may be a reason why we could only demonstrate a weak, non-significant effect of HRQOL on the incidence of asthma and allergic disease.

Although HRQOL may be related to the incidence of allergic disease and HRQOL seems to be associated with growing up on a farm, it does not mediate the protective effect of exposure to farming environments on incidence of allergic disease.

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